PRODUCT CATEGORY RULES (PCR)
DATE 2021-04-22

PLASTIC WASTE AND SCRAP RECOVERY (RECYCLING) SERVICES

PRODUCT CATEGORY CLASSIFICATION: UN CPC 8942

2013:08
VERSION 2:13

VALID UNTIL: 2022-02-01

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1 INTRODUCTION

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD® System: a programme for type III environmental declarations[1] according to ISO 14025:2006. Environmental Product Declarations (EPD) are voluntary documents for a company or organisation to present transparent information about the life cycle environmental impact for their goods or services.

The rules for the overall administration and operation of the programme are the General Programme Instructions, publicly available at www.environdec.com. A PCR complements the General Programme Instructions and the standards by providing specific rules, requirements and guidelines for developing an EPD for one or more specific product categories (see Figure 1). A PCR should enable different practitioners using the PCR to generate consistent results when assessing products of the same product category.

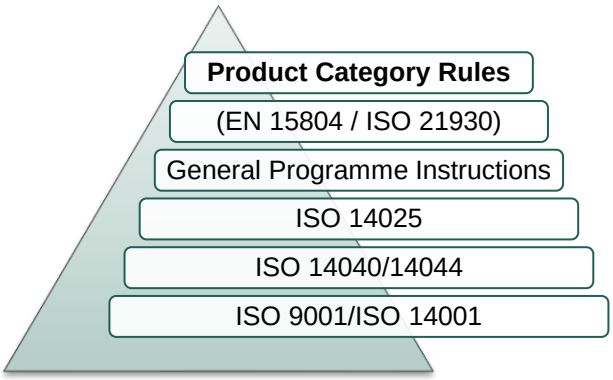

Figure 1 Illustration PCR in relation to the hierarchy of standards and other documents.

Within the present PCR, the following terminology is adopted:

- The term “shall” is used to indicate what is obligatory.
- The term “should” is used to indicate a recommendation, rather than a requirement.
- The term “may” or “can” is used to indicate an option that is permissible

For the definition of terms used in the document, see the normative standards.

A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. The latest version of the PCR is available via www.environdec.com. Stakeholder feedback on PCRs is very much encouraged. Any comments on this PCR document may be given via the PCR Forum at www.environdec.com or sent directly to the PCR moderator during its development or during the period of validity.

Any references to this document should include the PCR registration number, name and version.

The programme operator maintains the copyright of the document to ensure that it is possible to publish, update when necessary, and available to all organisations to develop and register EPDs. Stakeholders participating in PCR development should be acknowledged in the final document and on the website.

[1] Type III environmental declarations in the International EPD® System are referred to as EPD, Environmental Product Declarations.

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Plastic waste and scrap recovery (recycling) services
Registration number and version:	2013:08, version 2.13
Programme:	The International EPD® System
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: info@environdec.com
PCR moderator:	Paolo Simon Ostan, paolo.simon.ostan@quotasette.it
PCR Committee:	RadiciGroup and QUOTA SETTE S.r.l.
Date of publication and last revision:	2021-04-22 (Version 2.13) Version 1.0 was published 2013-07-04. More information in Section 7.
Valid until:	2022-02-01
Schedule for renewal:	A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. When the PCR is about to expire the PCR moderator shall initiate a discussion with the Secretariat how to proceed with updating the document and renewing its validity. A PCR document may be revised during its period of validity provided significant and well-justified proposals for changes or amendments are presented. See www.environdec.com for up-to-date information and the latest version.
Standards conformance:	▪ General Programme Instructions of the International EPD® System, version 3.0, based on ISO 14025 and ISO 14040/14044 ▪ PCR Basic Module, CPC Division 89 Other manufacturing services; publishing, printing and reproduction services; materials recovery services, version 3.01, dated 2018-11-06
PCR language(s):	This PCR was developed and is available in English. In case of translated versions the English version takes precedence in case of any discrepancies.

2.2 SCOPE OF PCR

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of plastic waste and scrap recovery (recycling) services and the declaration of this performance by an EPD. The product category corresponds to UN CPC 8942.

This PCR specifies the requirements for the LCA study and for the format and content of the EPD relevant to plastic waste and scrap recovery (recycling) services.

Within the plastic waste recovery and recycling services the following definition of "recovered material" and "recyclate" shall be considered as reference definitions[2]:

recovered material: plastics material that has been separated, diverted or removed from the solid-waste stream in order to be recycled or used to substitute virgin raw materials

recyclate: plastics material resulting from the recycling of plastics waste

NOTE 1 The terms "plastics secondary raw material", "recycled plastics" and "regenerate" are sometimes used synonymously.

NOTE 2 As soon as the used plastics material has been treated in such a way that it is ready to replace a virgin product, material or substance in a production process, it loses its characteristics as waste.

In particular the ISIC-CPC's classification is:

Group	Class	Description	Corresponding ISIC Rev.4 code(s)
894		Materials recovery (recycling) services, on a fee or contract basis	
	8942	Non-metal waste and scrap recovery (recycling) services, on a fee or contract basis	3830

See http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=25 for additional information about the product category.

Plastic waste is classified as follows[3]:

- **Post-industrial** (or **Pre-consumer)** plastic waste is scrap resulting from the manufacturing of products that contain plastic as one of their components, and which leaves the specific facility where it was generated, often for recycling. This stream can currently be classified as waste by some authorities, and as non-waste by others (normally under the denomination by-product, which in some countries/regions is dealt with within waste legislation, and in others out of waste legislation).
- **Post-consumer** plastic waste is a waste material originated after the use of plastic products at the consumer market. This stream is always classified as waste.

  Most post-consumer waste contains a wide range of plastic polymer types, reflecting the variety of plastic polymers consumed in daily life.

  The *SPI*[4] resin identification coding system is a set of symbols placed on plastics to identify the polymer type. It is used internationally to allow efficient separation of different polymer types for recycling.

This PCR document takes into account only the material that is waste, and therefore most often refers to external plastic waste (both post-industrial and post-consumer). If internal waste[5] is classified as waste, then it is also under the purpose of this document.

Internal plastic waste is not usually registered as waste but the classification which has to be taken into account is defined by the legislation of the country in which the PCR is applied (e.g. EU legislation in Europe).

Two main types of plastic waste recycling can be distinguished, mechanical and chemical (also called feedstock recycling)[6]:

- **Mechanical recycling** refers to the processing of waste plastic by physical means (grinding, shredding, and melting) back to plastic products. The chemical structure of the material remains almost the same. At present, the recycling of waste plastic is

[2] ISO 15270:2008 Plastics — Guidelines for the recovery and recycling of plastics waste
[3]adapted from: JRC, IPTS, (2013), End-of-waste criteria for waste plastic for conversion, technical proposals, final draft report, March 2013".
[4] Society of the Plastics Industry
[5] It refers to defective products detected and rejected by a quality control process during the industrial process of plastics manufacturing, production off-cuts, etc. These materials are often immediately absorbed by the respective industrial process as a raw material, not leaving the plastics manufacturing plant
[6] adapted from: JRC, IPTS, (2013), End-of-waste criteria for waste plastic for conversion, technical proposals, final draft report, March 2013".

dominated by mechanical processes. This recycling path is viable when waste plastics are or can easily by cleaned and sorted properly. Added to this, the process requires large and quite constant input.

- **Chemical recycling** involves the transformation of plastic polymers by means of heat and/or chemical agents to yield monomers or other hydrocarbon products that may be used to produce new polymers, refined chemicals or fuels.

This PCR document takes into account both mechanical and chemical recycling.

The following recovery/recycling processes are excluded from the purpose of this PCR document:

- Chemical recycling to yield fuels;
- Energy recovery from plastic waste incineration (CPC code 9433);
- All the processes which cannot be attributed to the plastic material of the code 8942.

The product group and CPC code shall be specified in the EPD.

2.2.2 SPECIFICATION OF THE SERVICE

The following information, if applicable, shall be included in the EPD. Any exclusion shall be justified.

- A brief description of the recycling technology used, including a technical characterization;
- The recycling process yield calculated as follows:

$$\text{Recycling process yield (\%)} = \frac{\text{1.000 kg of plastic waste input} - \text{mass of plastic waste generated in the Core Module}}{\text{1.000 kg of plastic waste input}} \times 100$$

- The selection criteria of the plastic waste sources and
- Characterisation of scrap, e.g. polymer type and gross calorific value
- The percentage of post-industrial and post-consumer waste inputs
- The qualitative yield of the recycling process by reporting the characterization of the recycled plastic material in comparison with the virgin plastic material for the same function
- The mechanical characterization of the final recycled plastic material

The following voluntary information may be included:

- The characterization of the plastic waste sources
- Information about the uses of the recycled plastic material (e.g. for textile sector, food contact materials sector)
- Regulatory constraints

Other specifications are voluntary

2.2.3 GEOGRAPHICAL REGION

This PCR is applicable to be used globally.

2.2.4 EPD VALIDITY

An EPD based on this PCR shall be valid from its registration and publication at www.environdec.com and for a five year period starting from the date of the verification report (“approval date”), or until the EPD has been de-registered from the International EPD® System.

An EPD shall be updated and re-verified during its validity if changes in technology or other circumstances have led to:

- an increase of 10% or more of any of the indicators listed in Section 5.4.5.1,

- errors in the declared information, or
- significant changes to the declared product information, content declaration, or additional environmental information.

If such changes have occurred, but the EPD is not updated, the EPD owner shall contact the Secretariat to de-register the EPD.

3 PCR REVIEW AND BACKGROUND INFORMATION

This PCR was developed in accordance with the process described in the General Programme Instructions of the International EPD® System, including PCR review and open consultation.

3.1 PCR REVIEW

3.1.1 VERSION 1.0

Version 1.0 of the PCR was reviewed by the Technical Committee of the International EPD® System as the PCR review panel.

3.1.2 VERSION 2.0

PCR review panel:	The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com. Members of the Technical Committee were requested to state any potential conflict of interest with the PCR moderator or PCR committee and were excused from the review.
Chair of the PCR review:	Lars-Gunnar Lindfors
Review dates:	2017-01-12 – 2017-01-31

3.2 OPEN CONSULTATION

3.2.1 VERSION 1.0

Version 1.0 of this PCR was available for open consultation at www.environdec.com from 2012-11-20 until 2013-01-11.

3.2.2 VERSION 2.0

This PCR was available for open consultation from 2016-08-30 until 2016-10-30, during which any stakeholder was able to provide comments by posting on the PCR forum on www.environdec.com or by contacting the PCR moderator.

A total of 202 stakeholders were invited via e-mail or other means to take part in the open consultation and were encouraged to forward the invitation to other relevant stakeholders.

3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

As part of the development of this PCR, existing PCRs were considered in order to avoid overlaps in scope. The existence of such documents was checked in the public PCR listings of the following programmes based on ISO 14025 or similar:

- International EPD® System. www.environdec.com.
- GlobalEPD
- EPD Norway
- IBU
- PEP ecopassport®
- EarthSure
- EDF

- KEITI Environmental Declaration of Product
- JEMAI EcoLeaf
- JEMAI CFP Program
- UL Environment
- ASTM International EPD Program
- NSF International National Center for Sustainability Standards EPD
- SM Transparency Report Program
- FPInnovations EPD Program on wood building products
- ICC Evaluation Service Environmental Product Declaration Program
- Carbon Leadership Forum PCRs
- BRE Global EN EPD Verification Scheme
- DAPcons®
- SCS Global Services

No existing PCRs with overlapping scope were identified

In case of production chain, this PCR document can be potentially connected to the following PCR documents:

- PCR 2010:16 - Plastics in primary forms
- PCR 2013:03 - Man made fibres (Synthetic)-expired
- PCR 2013:12 - Textile yarn and thread
- 2011:06, Nonwovens for clothing, protective clothing and upholstery (CPC 27922)

3.4 REASONING FOR DEVELOPMENT OF PCR

The motivation to develop this PCR is based on the harmonization of methodological rules for the LCA studies regarding the plastic waste and scrap recovery (recycling) services and the declaration of the environmental performances with an EPD.

3.5 UNDERLYING STUDIES

The methodological choices made during the development of this PCR (functional unit/declared unit, system boundary, allocation methods, impact categories, data quality rules, etc.) in this PCR were primarily based on the following underlying studies:

- Caprotti S. 2016, Life Cycle Assessment del Servizio di Recupero Scarti e Rifiuti Plastici, Rev1, 18th April 2016

4 GOAL AND SCOPE, LIFE CYCLE INVENTORY AND LIFE CYCLE IMPACT ASSESSMENT

The goal of this section is to provide specific rules, requirements and guidelines for developing an EPD for the product category as defined in Section 2.2.1

4.1 FUNCTIONAL UNIT/DECLARED UNIT

The declared unit is the recovery/recycling of 1000 kg of plastic waste and/or scrap.

The quantity of 1000 kg is to be intended at the moment of the collection, when the material is classified as waste, before it is subjected to any sorting process which reduces its weight or changes its features.

The declared unit shall be stated in the EPD. The environmental impact shall be given per declared unit. A description of the function of the product should be included in the EPD®, if relevant.

4.2 REFERENCE SERVICE LIFE (RSL)

Not applicable for this product category.

4.3 SYSTEM BOUNDARY

The International EPD® System uses an approach where all attributional processes from “cradle to grave” should be included using the principle of “limited loss of information at the final product”.

The scope of this PCR and EPDs based on it is cradle-to-gate.

4.3.1 LIFE CYCLE STAGES

For the purpose of different data quality rules and for the presentation of results, the life cycle of products is divided into three different life cycle stages:

- Upstream processes (from cradle-to-gate);
- Core processes (from gate-to-gate)
- Downstream processes (from gate-to-grave)

In the EPD, the environmental performance associated with each of the three life-cycle stages above shall be reported separately. The processes included in the scope of the PCR and belonging to each life cycle stage are described in Sections 4.3.1.1–4.3.1.3.

4.3.1.1. Upstream processes

The following attributional processes are part of the product system and classified as upstream processes:

- Collection of plastic waste
- Extraction of non-renewable resources
- Growing, refining and storage of renewable resources
- Virgin raw material production
- Additives activators and adjuvants production
- Primary and secondary packaging production
- Maintenance and washing products production
- All relevant transportation (transport of raw materials, fuels and products at all stages)

Upstream processes not listed may also be included. All elementary flows at resource extraction shall be included, except for the flows that fall under the general cut-off rule in Section 4.5.

According to LCA principles, all energetic input flows to the upstream processes, including electricity, heating fuels, steam, compressed air, etc. and the water consumption shall be considered. The production processes of energy wares used in the extraction and refinement shall be included.

4.3.1.2. Core processes

The following attributional processes are part of the product system and classified as core processes:

- Transportation of all input materials to the production plant
- Storage and handling of materials
- Pre-treatments[7]:
  - Sorting[8]
  - Cleaning
  - Size reduction
- Advanced treatments*:
  - Cutting
  - Shredding
  - Sorting[9]
  - Contaminants separation
  - Floating/cleaning
- Extrusion (in case of Mechanical Recycling)
- Feedstock recycling and polymerization (in case of Chemical Recycling)
- Pelletizing or production of other plastic materials forms
- Each other relevant process
- Storage and packaging of final product
- Impacts due to the electricity production according the proper energy mix hypotheses;

According to LCA principles, all energetic input flows to the core processes, including electricity, heating fuels, steam, compressed air, etc. and the water consumption shall be considered. The production processes of energy wares used in the production, as define in ISO13600, shall be included.

Moreover, all the emissions to air, water and soil shall be considered.

Treatment of waste and wastewater generated by all core processes shall be included (In compliance with the General Programme Instructions - Handling of wastes, treatment of worn-out products and output flows that are reused or recycled).

Some specific ‘data quality rules’ have been defined taking into account that some core processes may be carried out outside the company which develops the EPD. For more details see section 4.10.2.

Manufacturing processes not listed may also be included. The production of the raw materials used for production of all product parts shall be included. A minimum of 99% of the total weight of the declared product including packaging shall be included.

The technical system shall not include:

- Manufacturing of production equipment, buildings and other capital goods.
- Travel to and from work by personnel

[7]The sequence of the operations may be different. Any other treatment, not listed, shall be included
[8] It refers to the operation to separate the plastic waste into the main plastic polymer categories
[9] It refers to additional sorting (e.g. Near Infrared) once the material has been shredded

- Research and development activities.

4.3.1.3. Downstream processes

The downstream processes include:

- Transportation of recycled plastic material from final manufacturing to an average retailer/distribution platform

Optionally, an EPD may provide environmentally relevant information pertaining to:

- Recycled/recovery material use phase

This optional information shall be reported separated from the mandatory downstream information (to make comparisons between EPDs possible).

The processes applied to the recycled plastic material, after the pelletizing process, shall be clearly described in the EPD, as well as the main application(s) of the final product.

4.3.2 OTHER BOUNDARY SETTING

4.3.2.1. Boundary towards nature

Boundaries to nature are defined as flows of material and energy resources from nature into the system. Emissions to air, water and soil cross the system boundary when they are emitted from or leaving the product system.

4.3.2.2. Boundaries in the life cycle

See Section 4.3.1. The EPD may present the information divided into additional sub-divisions.

4.3.2.3. Boundaries towards other technical systems

See Section 4.6.2.

4.4 SYSTEM DIAGRAM

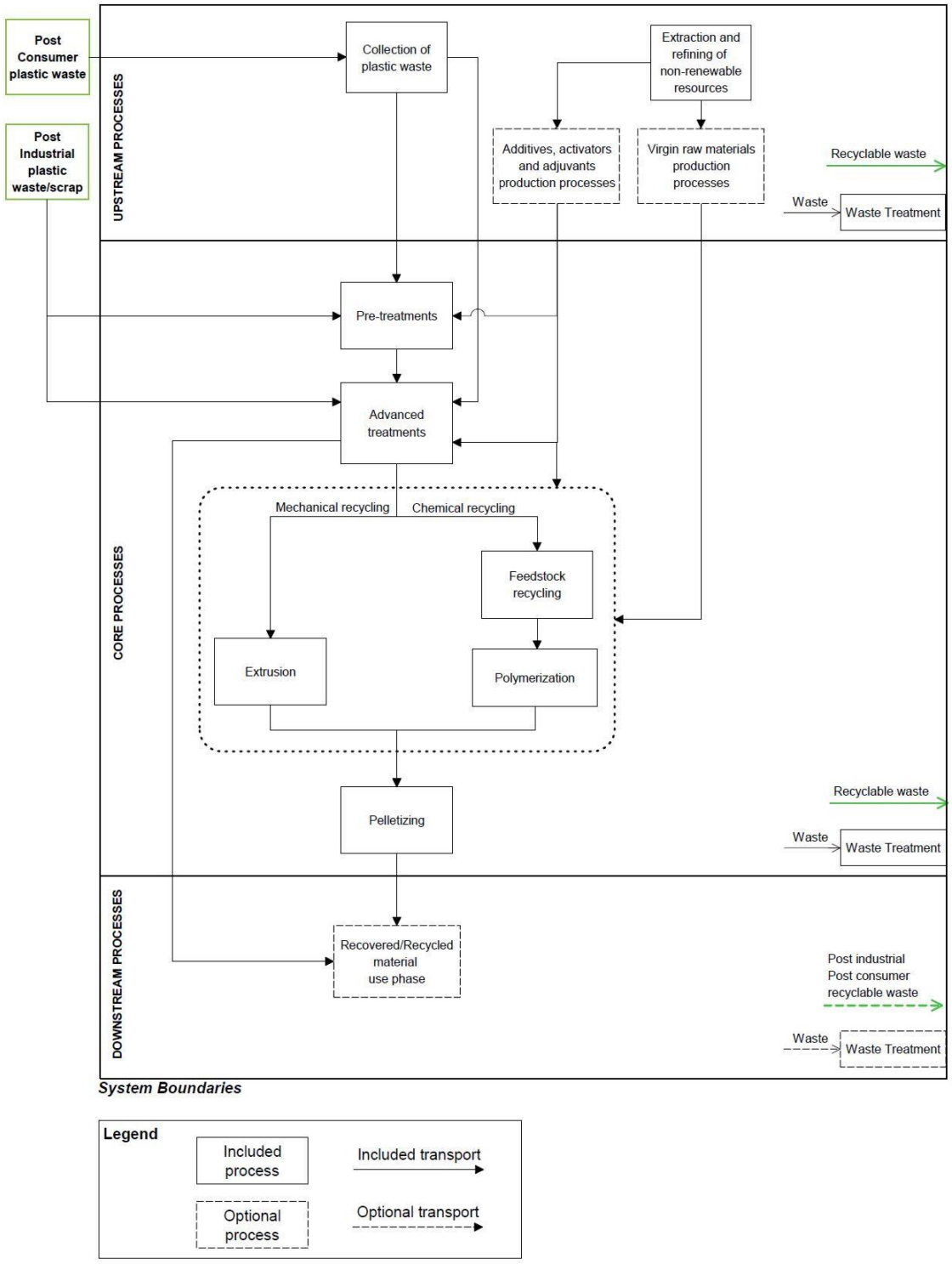

Figure 2 *System diagram illustrating the processes that are included in the product system, divided into upstream, core and downstream processes.*

(*) Virgin raw materials, additives, activators and adjuvants are sometimes used to ensure uniformity of the final plastic material in terms of mechanical characteristics.

The figure illustrates that all relevant unit processes taking place in the upstream-, core- and downstream processes shall be included. To identify the relevance of including upstream and downstream infrastructure the commonly defined cut-off rules shall be applied.

The treatment processes (final disposal) of wastes generated by the activities included in the system boundaries should be included in the LCA calculation. When it is not possible for some reasons (such as database framework or lack of information), the amount of wastes and the destination shall be declared.

4.5 CUT-OFF RULES

Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts shall be included (not including processes that are explicitly outside the system boundary as described in Section 4.3).

The check for cut-off rules in a satisfactory way is through the combination of expert judgment based on experience of similar product systems and a sensitivity analysis in which it is possible to understand how the un-investigated input or output could affect the final results.

4.6 ALLOCATION RULES

4.6.1 CO-PRODUCT ALLOCATION

The following step-wise procedure shall be applied for multifunctional products and multiproduct processes:

1. Allocation shall be avoided, if possible, by dividing the unit process into two or more sub-processes and collecting the environmental data related to these sub-processes.
2. If allocation cannot be avoided, the inputs and outputs of the system shall be partitioned between its different products or functions in a way that reflects the underlying physical relationships between them; i.e. they should reflect the way in which the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system.
3. Where physical relationships alone cannot be established or used as the basis for allocation (or they are too time consuming), Table 1 shall be consulted for key processes. For processes not listed the most suitable allocation procedure shall be used and documented.

PROCESS	MAIN PRODUCT AND CO-PRODUCTS	ALLOCATION INSTRUCTION
Pre-treatments - sorting	Polymer 1, polymer 2 etc	input and output data might be allocated between co-products in proportion to the economic value of the products. If the economical allocation has been used, a specific sensitivity analysis shall be provided to the verifier and the monitoring of the relationship between results and current economic value shall be documented and updated. The allocation method shall be justified and described in the LCA report. In case an allocation different from the physical relationship allocation is used, it shall be declared in the EPD.

Table 1 Allocation procedure for key processes in the product system, if steps 1 and 2 are not possible.

4.6.2 REUSE, RECYCLING, AND RECOVERY

In the framework of the International EPD® System, the methodological choices for allocation for reuse, recycling and recovery have been set according to the polluter pays principle (PPP). This means that the generator of the waste shall carry the full environmental impact until the point in the product's life cycle at which the waste is transported to a scrapyard or the gate of a waste processing plant (collection site). The subsequent user of the waste shall carry the environmental impact from the processing and refinement of the waste but not the environmental impact caused in the "earlier" life cycles. See General Programme Instruction for further information and examples.

4.7 DATA QUALITY REQUIREMENTS

An LCA calculation requires two different kinds of information:

- data related to the **environmental aspects** of the considered system (such materials or energy flows that enter the production system). These data usually come from the company that is performing the LCA calculation.
- data related to the **life cycle impacts** of the material or energy flows that enter the production system. These data usually come from databases.

Data on environmental aspects shall be as specific as possible and shall be representative of the studied process.

Data on the life cycle of materials or energy inputs are classified into three categories – specific data, selected generic data, and proxy data, defined as follows:

- **specific data** (also referred to as “primary data” or “site-specific data”) – data gathered from the actual manufacturing plant where product-specific processes are carried out, and data from other parts of the life cycle traced to the specific product system under study, e.g. materials or electricity provided by a contracted supplier that is able to provide data for the actual delivered services, transportation that takes place based on actual fuel consumption, and related emissions, etc.,
- **generic data** (sometimes referred to as “secondary data”), divided into**:**
  - **selected generic data** – data from commonly available data sources (e.g. commercial databases and free databases) that fulfil prescribed data quality characteristics for precision, completeness, and,
  - **proxy data** – data from commonly available data sources (e.g. commercial databases and free databases) that do not fulfil all of the data quality characteristics of “selected generic data”.

As a general rule, specific data shall always be used, if available, after performing a data quality assessment. It is mandatory to use specific data for the core processes as defined above. For the upstream processes, downstream processes, and infrastructure, generic data may also be used if specific data are not available.

Some specific ‘data quality rules’ have been defined taking into account that some core processes may be carried out outside the company which develops the EPD. For more details see 4.10.2.

Any data used should preferably represent average values for a specific reference year. However, the way these data are generated could vary, e.g. over time, and in such cases they should have the form of a representative annual average value for a specified reference period. Such deviations should be declared.

4.7.1 RULES FOR USING GENERIC DATA

The attributional LCA approach in the International EPD® System forms the basic prerequisites for selecting generic data. To allow the classification of generic data as “selected generic data”, they shall fulfil selected prescribed characteristics for precision, completeness, and representativeness (temporal, geographical, and technological), such as:

- the reference year must be as current as possible and preferably assessed to be representative for at least the validity period of the EPD,
- the cut-off criteria to be met on the level of the modelled product system are the qualitative coverage of at least 99% of energy, mass, and overall environmental relevance of the flows,
- completeness in which the inventory data set should, in principle, cover all elementary flows that contribute to a relevant degree of the impact categories, and
- the representativeness of the resulting inventory in the given temporal, technological, and geographical reference should, as a general principle, be better than ±5% of the environmental impact of fully representative data.
- Representativeness of the geographical area should adhere to “Data deriving from areas with the same legislative framework and the same energetic mix”,
- Technological equivalence adhere to “Data deriving from the same chemical and physical processes or at least the same technology coverage (nature of the technology mix, e.g. weighted average of the actual process mix, best available technology or worst operating unit)”,
- Boundaries towards nature adhere to “Data shall report all the quantitative information (resources, solid, liquid, gaseous emissions; etc.) necessary for the EPD”,

- Boundaries towards technical systems adhere to “The boundaries of the considered life cycle stage shall be equivalent”,
- The allocation rules used in selected generic data shall follow the bookkeeping (attributional) LCA approach, system expansion and credits due to avoided processes shall not have been applied,

If selected generic data that meets the requirements of the International EPD® System are not available as the necessary input data, proxy data may be used and documented. The environmental impacts associated with proxy data shall not exceed 10% of the overall environmental impact from the product system.

The EPD may include a data quality declaration to demonstrate the share of specific data, selected generic data and proxy data for the environmental impacts.

If relevant, the EPD may include a reference to the database(s) used.

4.8 RECOMMENDED DATABASES FOR GENERIC DATA

No specific databases are recommended for generic data.

4.9 IMPACT CATEGORIES AND IMPACT ASSESSMENT

The EPD shall declare the default impact categories as described in the General Programme Instructions. The characterisation models and factors to use for the default impact categories are available on www.environdec.com and shall be updated on a regular basis based on the latest developments in LCA methodology and ensuring the market stability of EPDs. The source and version of the characterisation models and the factors used shall be reported in the EPD. Alternative regional life cycle impact assessment methods and characterisation factors are allowed to be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the difference between the different sets of indicators, as they may appear to the reader to display duplicate information.

4.10 OTHER CALCULATION RULES AND SCENARIOS

4.10.1 UPSTREAM PROCESSES

The following requirements apply to the upstream processes:

- Data referring to processes and activities upstream in a supply chain over which an organisation has direct management control shall be specific and collected on site.
- Data referring to contractors that supply main parts, packaging, or main auxiliaries should be requested from the contractor as specific data, as well as infrastructure, where relevant.
- The transport of main parts and components along the supply chain to a distribution point (e.g. a stockroom or warehouse) where the final delivery to the manufacturer can take place based on the actual transportation mode, distance from the supplier, and vehicle load.
- In case specific data is lacking, selected generic data may be used. If this is also lacking, proxy data may be used.
- For the electricity used in the upstream processes, electricity production impacts shall be accounted for in this priority when specific data are used in the upstream processes:

    1. Specific electricity mix as generated, or purchased, from an electricity supplier, demonstrated by a Guarantee of Origin (or similar, where reliability, traceability, and the avoidance of double-counting are ensured) as provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used.[10]
    2. National residual electricity mix or residual electricity mix on the market
    3. National electricity production mix or electricity mix on the market.

    The mix of electricity used in upstream processes shall be documented in the EPD, where relevant.

[10] The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix of the electricity supplier.

4.10.2 CORE PROCESSES

The following requirements apply to the core processes:

- Specific data shall be used for the assembly of the product and for the manufacture of main parts as well as for on-site generation of steam, heat, electricity, etc., where relevant. However, selected generic data may be used for the following core processes if they are carried out outside the company which develops the EPD and the suppliers/customers don't accept to share specific data:
  - Pre-treatments (for more details see section 4.3.1.2)
  - Polymerization (in case of Chemical Recycling)
  - Pelletizing or production of other plastic materials forms
- If "selected generic data" do not supply the necessary data, "other generic data" may be used and documented. The environmental impact of the processes where the other generic data are used must not exceed 10% of the overall environmental impact from the product system.
- For the electricity used in the core processes, electricity production impacts shall be accounted for in this priority:
  1. Specific electricity mix as generated, or purchased, from an electricity supplier, demonstrated by a Guarantee of Origin (or similar, where reliability, traceability, and the avoidance of double-counting are ensured) as provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used.[11]
  2. National residual electricity mix or residual electricity mix on the market
  3. National electricity production mix or electricity mix on the market.

  The mix of electricity used in the core processes shall be documented in the EPD, where relevant.
- Transport from the final delivery point of raw materials, chemicals, main parts, and components (see above regarding upstream processes) to the manufacturing plant/place of service provision should be based on the actual transportation mode, distance from the supplier, and vehicle load, if available.
- Waste treatment processes of manufacturing waste should be based on specific data, if available.

NOTE 3 The quantity of the plastic waste entering in the core processes may be increased, compared to the 1'000 kg intended at the moment of the collection, for the effect of additions of raw materials and additives when they are necessary to ensure uniformity of the final plastic material in terms of mechanical characteristics.

The core processes carried out after the "advanced treatments" are generally processes that have closed-loop recycling (internal recovery) and therefore the "recycling process yield", as defined at 2.2.2, is not affected by additions of virgin raw materials and additives in this process stage.

NOTE 4 Since the quantities of virgin raw materials and additives, added to ensure stable mechanical characteristics, may change continuously according to the process demand, they should be accounted through a yearly average.

4.10.3 DOWNSTREAM PROCESSES

The following requirements apply to the downstream processes:

- Data for the use stage are usually based on scenarios, but specific data should be used when available and relevant.
- Data on the pollutant emissions from the use stage should be based on documented tests, verified studies in conjunction with average or typical product use, or recommendations concerning suitable product use. Whenever applicable, test methods shall be internationally recognised.
- The use of electricity in the region/country where the product is used (as specified in the geographical scope of the EPD) shall be accounted for in the following priority:
  1. National residual electricity mix or residual mix on the market
  2. National electricity production mix or electricity mix on the market

[11] The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix of the electricity supplier.

The mix of electricity used in the downstream processes shall be documented in the EPD, where relevant.

- Distribution from final manufacturing to customer shall be included in the LCA and EPD. The transport of the product to the customer shall be described in the reference PCR, which should reflect the actual situation to the best extent possible. The following priority should be used:

  1. Actual transportation distances and types.
  2. Calculated as the average distance of a product of that product type transported by different means of transport modes.
  3. Calculated as a fixed long transport, such as 1 000 km transport by lorry or 10 000 km by airplane, according to product type.

- The recycled/recovery material use phase may be included in the LCA and EPD. The processes applied to the recycled plastic material after the pelletizing process shall be clearly described in the EPD.
- Scenarios for the end-of-life stage shall be technically and economically practicable and compliant with current regulations in the relevant geographical region based on the geographical scope of the EPD. Key assumptions regarding the end-of-life stage scenario shall be documented.

5 CONTENT AND FORMAT OF EPD

EPDs based on this PCR shall contain the information described in this section. Flexibility is allowed in the formatting and layout provided that the EPD still includes the prescribed information. A generic template for EPDs is available via www.environdec.com

As a general rule the EPD content:

- shall be in line with the requirements and guidelines in ISO 14020 (Environmental labels and declarations - General principles),
- shall be verifiable, accurate, relevant and not misleading, and
- shall not include rating, judgements or direct comparison with other products.

An EPD should be made with a reasonable number of pages for the intended audience and use.

5.1 EPD LANGUAGES

EPDs should be published in English but may also be published in additional languages. If the EPD is not available in English, it shall contain an executive summary in English including the main content of the EPD. This summary is part of the EPD and thus subject to the same verification procedure.

5.2 UNITS AND QUANTITIES

The following requirements apply for units and quantities:

- The International System of Units (SI units) shall be used, e.g., kilograms (kg), Joules (J) and metres (m). Reasonable multiples of SI units may be decided in the PCR to improve readability, e.g., grams (g) or megajoules (MJ). The following exceptions apply:
  - Resources used for energy input (primary energy) should be expressed as kilowatt-hours (kWh) or megajoules (MJ), including renewable energy sources, e.g., hydropower, wind power and geothermal power.
  - Water use should be expressed in cubic metres (m^3)
  - Temperature should be expressed in degrees Celsius (°C),
  - Time should be expressed in the units most practical, e.g., seconds, minutes, hours, days or years.
- Three significant figures[12] should be adopted for all results. The number of significant digits shall be appropriate and consistent.
- The thousand separator and decimal mark in the EPD shall follow one of the following styles (a number with six significant figures shown for illustration):
  - SI style (French version): 1 234,56
  - SI style (English version): 1 234.56

  In case of potential confusion or intended use of the EPD in markets where different symbols are used, the EPD shall state what symbols are used for thousand separator and decimal mark.
- Dates and times presented in the EPD should follow the format in ISO 8601. For years, the prescribed format is YYYY-MM-DD, e.g., 2017-03-26 for March 26th, 2017.
- The result tables shall:
  - Only contain values or the letters “INA” (Indicator Not Assessed). It is not possible to specify INA for mandatory indicators. INA shall only be used for voluntary parameters that are not quantified because no data is available.[13]
  - Contain no blank cells, hyphens, less than or greater than signs or letters (except “INA”).

[12] Significant figures are those digits that carry meaning contributing to its precision. For example with two significant digits, the result of 123.45 shall be displayed as 120, and 0.12345 shall be displayed as 0.12. In scientific notation, these two examples would be displayed as $1.2*10^2$ and $1.2*10^{-2}$.

[13] This requirement does not intend to give guidance on what indicators are mandated (“shall”) or voluntary.

- Use the value 0 only for parameters that have been calculated to be zero.
- Footnotes shall be used to explain any limitation to the result value.

5.3 USE OF IMAGES IN EPD

Images used in the EPD, especially pictures featured on the cover page, may in themselves be interpreted as an environmental claim. Images such as trees, mountains, wildlife that are not related to the declared product should therefore be used with caution and in compliance with national legislation and best available practices in the markets in which the EPD is intended to be used.

5.4 EPD REPORTING FORMAT

The reporting format of the EPD shall include the following sections:

- Cover page (see Section 5.4.1)
- Programme information (see Section 5.4.2)
- Product information (see Section 5.4.3)
- Content declaration (see Section 5.4.4)
- Environmental performance (see Section 5.4.5)
- Additional environmental information (see Section 5.4.6)
- References (see Section 5.4.9)

The following information shall be included, when applicable:

- Information related to Sector EPDs (see Section 5.4.7)
- Differences versus previous versions (see Section 5.4.8)
- Executive summary in English (see Section 5.4.10)

5.4.1 COVER PAGE

The cover page shall include:

- Service name and image,
- Name and logotype of EPD owner,
- The text “Environmental Product Declaration” and/or “EPD”
- *Programme: The International EPD® System, www.environdec.com,*
- *Programme operator: EPD International AB*
- Logotype of the International EPD® System,
- EPD registration number as issued by the programme operator[14],
- *Date of publication (issue): 20XX-YY-ZZ,*
- *Date of revision: 20XX-YY-ZZ*, when applicable,
- *Date of validity; 20XX-YY-ZZ*
- A note that “*An EPD should provide current information, and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com*.”

[14] The EPD shall not include a “registration number” if such is provided by the certification body, as this may be confused with the registration number issued by the programme operator.

- A statement of conformity with ISO 14025,

5.4.2 PROGRAMME INFORMATION

The programme information section of the EPD shall include:

- Address of programme operator: *EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com*
- The following mandatory statement from ISO 14025: "*EPDs within the same product category but from different programmes may not be comparable*."
- A statement that the EPD owner has the sole ownership, liability and responsibility of the EPD
- Information about verification[15] and reference PCR in a table with the following format and contents:

Product category rules (PCR): PCR 2013:08 Plastic waste and scrap recovery (recycling) services, v. 2.1. UN CPC 8942.
PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Lars-Gunnar Lindfors Contact via info@environdec.com.
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☐ EPD verification
Third party verifier: *<name, organisation and signature of the third party verifier>* *In case of certification bodies:* Accredited by: *<name of the accreditation body and accreditation number, if applicable>.* *In case of individual verifiers:* Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☐ No

5.4.3 SERVICE-RELATED INFORMATION

The service information section of the EPD shall include:

- Address and contact information to EPD owner,
- Description of the organisation. This may include information on service- or management system-related certifications (e.g. ISO 14024 Type I environmental labels, ISO 9001- and 14001-certificates and EMAS-registrations) and other relevant work the organisation wants to communicate (e.g. SA 8000, supply-chain management and social responsibility),
- Name and location of production site,
- Service identification by name, and an unambiguous identification of the product by standards, concessions or other means,
- Identification of the service according to the UN CPC scheme system. Other relevant codes for product classification may also be included, e.g.
  - Common Procurement Vocabulary (CPV),
  - United Nations Standard Products and Services Code® (UNSPSC),

[15] If the EPD has been verified by an approved individual verifier who has received contractual assistance from a certification body that is not accredited, this certification body shall not be included in this table.

- Classification of Products by Activity (NACE/CPA) or
- Australian and New Zealand Standard Industrial Classification (ANZSIC),

- Description of the service, its application/intended use and technical functions, e.g. expected service life time,
- Geographical scope of the EPD, i.e., for which geographical location(s) of use and end-of-life the product's performance has been calculated,
- Functional unit or declared unit,
- Reference service life (RSL), if applicable,
- Declaration of the year(s) covered by the data used for the LCA calculation and other relevant reference years,
- Reference to the main database(s) for generic data and LCA software used, if relevant,
- System diagram of the processes included in the LCA, divided into the life cycle stages,
- A simple visual representation or image of the service (if applicable),
- Description if the EPD system boundary is "cradle-to-gate", "cradle-to-gate with options" or "cradle-to-grave",
- Information on which life cycle stages are not considered (if any), with a justification of the omission,
- Relevant websites for more information or explanatory materials.
- Technical description of the service in terms of functional characteristics in accordance to section 2.2.2.

This section may also include:

- Name and contact information of organisation carrying out the underlying LCA study,
- Additional information about the underlying LCA-based information, such as assumptions, cut-off rules, data quality and allocation.

Any claims made about the product must be verifiable.

5.4.4 CONTENT DECLARATION

Concerning the plastic waste inputs, the verifier will check the compliance of all materials/substances to legal requirements and customer demands related to legal requirements

5.4.4.1. Information about packaging

As packaging is strongly connected with the product, the producer shall provide information about packaging in the EPD, when applicable. Packaging may be classified as:

- Distribution Packaging: packaging designed to contain one or more articles or packages, or bulk materials, for the purposes of transport, handling and/or distribution (ISO 21067-1:2016, Par. 2.2.6)
- Consumer Packaging: packaging constituting, with its content, a sales unit for the final user or consumer at the point of retail (ISO 21067-1:2016, Par. 2.2.7).

Consumer packaging is generally the outcome of eco-design processes, or other activities, under direct control of the organisation. Many critical categories with strict legal requirements belong to consumer packaging category like food contact packaging and pharmaceutical packaging.

The type and function of packaging shall be reported in the EPD.

A statement of the source of the materials (pre-consumer or post-consumer) shall be presented in the EPD when the packaging is made in whole or in part by recycled materials.

5.4.5 ENVIRONMENTAL PERFORMANCE

5.4.5.1. Environmental impacts

The indicators related to potential environmental impact listed in Table 2 shall be declared per functional unit or declared unit, and per life cycle stage.

PARAMETER		UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.				
	Biogenic	kg CO_2 eq.				
	Land use and land transformation	kg CO_2 eq.				
	TOTAL	kg CO_2 eq.				
Acidification potential (AP)		kg SO_2 eq.				
Eutrophication potential (EP)		kg PO_4^{3-} eq.				
Formation potential of tropospheric ozone (POCP)		kg C_2H_4 eq.				
Abiotic depletion potential – Elements		kg Sb eq.				
Abiotic depletion potential – Fossil fuels		MJ, net calorific value				
Water scarcity potential		m^3 eq.				

Table 2 Indicators describing potential environmental impacts[16].

Notes:

- Abiotic depletion potential is calculated and displayed as two separate indicators. ADP-fossil fuels include all fossil resources, while ADP-elements include all non-renewable material resources.

5.4.5.2. Use of resources

The indicators for resource use based on the life cycle inventory (LCI) listed in Table 3 shall be declared per functional unit or declared unit, and per life cycle stage.

PARAMETER		UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value				
	Used as raw materials	MJ, net calorific value				
	TOTAL	MJ, net calorific value				
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value				
	Used as raw materials	MJ, net calorific value				

[16] Please check www.environdec.com for the latest list of default impact categories, units and characterisation factors as they may have been updated compared to this table.

	TOTAL	MJ, net calorific value				
Secondary material		kg				
Renewable secondary fuels		MJ, net calorific value				
Non-renewable secondary fuels		MJ, net calorific value				
Net use of fresh water		m^3				

Table 3 Indicators describing use of primary and secondary resources.

Notes:

- In order to identify the primary energy used as an energy carrier (and not used as raw materials), the parameter may be calculated as the difference between the total input of primary energy and the input of energy resources used as raw materials.
- Energy content of biomass used for feed or food purposes shall not be considered.
- The net use of fresh water does not constitute a “water footprint” as potential environmental impacts due to the water use in different geographical locations is not captured. For this indicator:
  - Evaporation, transpiration, product integration, release into different drainage basins or the sea, displacement of water from one water resource type to another water resource type within a drainage basin (e.g. from groundwater to surface water) is included.
  - In-stream water use is not included.
  - For water used in closed loop processes (such as cooling system) and in power generation only the net water consumption (such as reintegration of water losses) should be considered.
  - Seawater shall not be included
  - Tap water or treated water (e.g. from a water treatment plant), or wastewater that is not directly released in the environment (e.g. sent to a wastewater treatment plant) are not elementary water flows, but intermediate flows from a process within the technosphere.
  - Additional transparency in terms of geographical location, type of water resource (e.g. groundwater, surface water), water quality and temporal aspects may be included as additional information.

5.4.5.3. Waste production and output flows

Waste generated along the whole life cycle production chains shall be treated following the technical specifications described in the General Programme Instructions. When the amount of waste or the output flows is from the life cycle inventory (LCI) are declared, the indicators in Table 4 and Table 5 shall be reported per functional unit or declared unit, and per life cycle stage.

PARAMETER	UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL
Hazardous waste disposed	kg				
Non-hazardous waste disposed	kg				
Radioactive waste disposed	kg				

Table 4 Indicators describing waste production.

PARAMETER	UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL
Components for reuse	kg				
Material for recycling	kg				
Materials for energy recovery	kg				

Exported energy, electricity	MJ				
Exported energy, thermal	MJ				

Table 5 Indicators describing output flows.

Notes:

- The parameters are calculated on the gross amounts leaving the system boundary of the product system in the LCI. If e.g. there is no gross amount of “exported energy, electricity” leaving the system boundary, this indicator is set to zero,
- The parameter “Materials for energy recovery” does not include materials for waste incineration. Waste incineration is a method of waste processing, when R1<60% (European Guideline on R1 energy interpretation), and is allocated within the system boundary.
- In case there are never any flows of these types leaving the system boundary for a product category, the indicators may be removed by the PCR.

5.4.5.4. Other environmental indicators

The following indicators per declared unit shall be reported in the EPD, divided into core, upstream and downstream module (if applicable):

- Recycled material content* of the final recycled plastic material, in percentage by mass of post-industrial and post-consumer recycled material

* for the definition of recycled material content refer to ISO 14021:1999 – point 7.8.1.1.

5.4.6 ADDITIONAL INFORMATION

The environmental impacts of 1 kg of secondary raw material, physical output of the waste recovery/recycling service, may be reported here. The impacts shall take in due consideration the efficiency ratio of the process expressed as: waste at collection-input / secondary raw material-output.

5.4.7 INFORMATION RELATED TO SECTOR EPDS

For sector EPDs, the following information shall also be included:

- a list of the contributing manufacturers that the Sector EPD covers,
- a description of how the selection of the sites/products has been done and how the average has been determined, and
- a statement that the document covers average values for an entire or partial product category (specifying the percentage of representativeness) and, hence, the declared product is an average that is not available for purchase on the market.

5.4.8 DIFFERENCES VERSUS PREVIOUS VERSIONS

For EPDs that have been updated, the following information shall also be included:

- a description of the differences versus previously published versions, e.g. a description of the percentage change in results and the main reason for the change;
- a revision date on the cover page

5.4.9 REFERENCES

This section shall include a list of references, including the General Programme Instructions (including version number), standards and PCR (registration number, name and version). The source and version of the characterisation models and the factors used shall be reported in the EPD.

- The underlying LCA

- The name, CPC code and version number of the PCR used
- Other documents that verify and complement the EPD®
- Instruction for recycling, if relevant
- The General Programme instructions of the International EPD® System

5.4.10 EXECUTIVE SUMMARY IN ENGLISH

For EPDs published in another language than English, an executive summary in English shall be included.

The executive summary should contain relevant summarised information related to the programme, product, environmental performance, additional information, information related to sector EPDs, references and differences versus previous versions.

6 GLOSSARY

CO_2	Carbon dioxide
CPC	Central product classification
EPD	Environmental product declaration
ISO	International Organization for Standardization
kg	kilogram
LCA	Life cycle assessment
PCR	Product Category Rules
SI	The International System of Units
SO_2	Sulphur dioxide
UN	United Nations

7 REFERENCES

Caprotti S. 2016, Life Cycle Assessment del Servizio di Recupero Scarti e Rifiuti Plastici, Rev1, 18th April 2016

CEN (2013), EN 15804:2012+A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

EPD International (2017) General Programme Instructions for the International EPD® System. Version 3.0, dated 2017-12-11. www.environdec.com

ISO (2000), ISO 14020:2000, Environmental labels and declarations – General principles

ISO (2004), ISO 8601:2004 Data elements and interchange formats – Information interchange – Representation of dates and times

ISO (2006a), ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO (2006b), ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework

ISO (2006c), ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines

ISO (2013), ISO/TS 14067:2013, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication

ISO (2014), ISO 14046:2014, Environmental management – Water footprint – Principles, requirements and guidelines

ISO (2017), ISO 21930:2017, Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services

8 VERSION HISTORY OF PCR

VERSION 1.0, 2013-07-04

Original version.

VERSION 1.01, 2014-02-21

Minor changes by the Secretariat without any impact on the technical aspects or methodological guidance:

- Information added to cover page
- Information added to General Information
- General introduction changed to latest version
- Minor editorial changes

VERSION 2.0, 2017-02-01

- Figure 1 at §6 reviewed
- Two explanatory notes added in 7.1.1
- New basic module used in order to ensure that the latest programme instructions and other best practices for PCR development are followed.

VERSION 2.01, 2017-04-10

- Removed reference to missing Annex A

VERSION 2.1, 2019-02-15

Updated in accordance with GPI 3.0 and new PCR basic module.

VERSION 2.11, 2019-03-07

Correction of spelling errors and minor editorial changes.

VERSION 2.12, 2019-09-06

- Clarified terms of use
- Editorial changes

VERSION 2.13, 2021-04-22

- Validity period prolonged until 2022-02-01, in line with Section 5.5.2.1 of the GPI.

